PATENT ABSTRACTS OF JAPAN

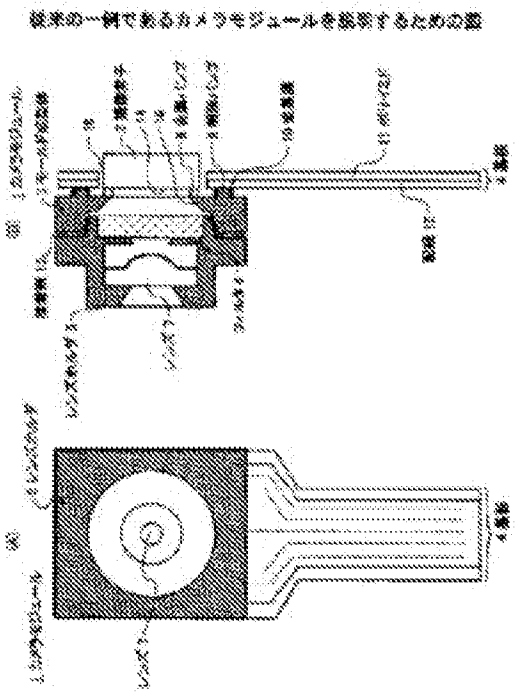
(11)Publication number : **2003-219284**
(43)Date of publication of application : **31.07.2003**

(51)Int.Cl. H04N 5/335
H01L 27/14

(21)Application number : **2002-016134**
(22)Date of filing : **24.01.2002**

(71)Applicant : **FUJITSU LTD**
(72)Inventor : **ONODERA MASANORI**
MORIYA SUSUMU
KOBAYASHI IZUMI
AOKI HIROSHI
YODA TOSHIYUKI
KAIYA HIROSHI

(54) CAMERA MODULE AND MANUFACTURING METHOD THEREOF



(57)Abstract:

PROBLEM TO BE SOLVED: To provide a camera module provided with an imaging semiconductor element and a lens for forming an object image onto the imaging semiconductor element for preventing dust particles from being deposited onto the imaging semiconductor element to attain high image quality for a photographed image and to provide a manufacturing method thereof.

SOLUTION: The camera module for generating an image signal from an imaged object image comprises; an imaging device 22 with a light receiving face 35; a mold resin 40A with the imaging device 22 mounted thereon and having an aperture 34B through which the light of an object image passes; a lens 27B for forming the object image onto the imaging device 22; a lens holder 25B for supporting and fixing the lens 27B and placed on the mold resin 40A; and an infrared ray filter 26 placed between the lens 27B and the light receiving face 35 and provided to the mold resin 40A.

[Detailed Description of the Invention]
[0001] [Field of the Invention]This invention relates to a camera module provided with the lens which is applied to a camera module and a manufacturing method for the same, especially carries out image formation of the object image to the semiconductor device for an image pick-up, and this semiconductor device for an image pick-up, and a manufacturing method for the same.

[0002]In recent years, the portable telephone and handy PC (portable personal computer) with which the miniature camera was incorporated are developed. For example, the portable telephone provided with the miniature camera picturizes a call person's image with a miniature camera, incorporates it as image data, and transmits the image data to a call partner. Such a miniature camera is generally constituted by the semiconductor device for an image pick-up (for example, C-MOS sensor), and the lens.

[0003]Miniaturization with much more portable telephone and handy PC is advanced, and the miniaturization is demanded also of the miniature camera used for these. In order to satisfy the demand of the miniaturization to such a camera, the semiconductor device package which unified and formed the lens and the semiconductor device for an image pick-up is developed.

[0004] [Description of the Prior Art] In recent years, the camera module using an image sensor is carried in small information terminals, such as a personal computer and a portable TV phone, as a camera system containing a signal processing system. The improvement in portability [terminal / this kind of / small information] is called for, and the demand of the miniaturization of a camera module has become strong in connection with this.

[0005]As for the camera module proposed until now, the ceramic closure type camera module was proposed. However, the material cost of members forming was expensive, and since circumference electronic parts, such as a chip capacitor, were not built in, the this ceramic closure type camera module must arrange electronic parts around a module, and was difficult [to miniaturize] for it.

[0006]Then, the thing of composition of being shown in drawing 1 and drawing 2 is proposed as a camera module which can be miniaturized. The camera module 1 shown in each figure is constituted by the semiconductor device 2 (henceforth the image sensor 2) for an image pick-up, the mold molding body 3, the substrate 4, and the lens-holder 5 grade. The image sensor 2 has the acceptance surface 14 into which an object image enters.

[0007]This image sensor 2 is located in the wearing opening 16 formed in the substrate 4, and flip chip bonding of it is carried out to the mold molding body 3. Under the present circumstances, the acceptance surface 14 of the image sensor 2 is constituted so that it may counter with the opening 15 formed in the mold molding body 3. The substrate 4 is a flexible substrate and has composition which formed the wiring 12 in the sheet shaped polyimide 11.

[0008]The resin vamp 9 is formed in the prescribed position of the mold molding body 3, and film formation of the metal membrane 10 is carried out to this resin vamp 9. This metal membrane 10 is connected with the wiring 12 of the substrate 4.

[0009]The metal membrane 10 has composition electrically connected with the metallic bump 8 via the wiring which was formed in the mold molding body 3, and which is not illustrated. Thereby, the image sensor 2 and the substrate 4 serve as composition by which the electrical link was carried out via the mold molding body 3 and the metallic bump 8.

[0010]The lens holder 5 is considered as the composition which installed the lens 7 for carrying out image formation of the object image to the image sensor 2, and the lens 7 which intercepts the infrared rays leading to degradation of an image pick. This lens holder 5 is joined to the mold molding body 3 by the adhesives 13 for holder immobilization.

[0011]Since it is the composition which the image sensor 2 was located in the wearing opening 16 formed in the substrate 4, and carried out flip chip bonding to the mold molding body 3 with wiring according to the camera module 1 considered as the above-mentioned composition, slimming down and a miniaturization of the camera module 1 can be attained. In the camera module 1 shown in drawing 1 and drawing 2, the filter 6 was also considered as the composition fixed to the lens holder 5 with the lens 7.

[0012] [Problem(s) to be Solved by the Invention]In the above-mentioned conventional camera module 1, since the image sensor 2 needs to incorporate picture information unlike semiconductor devices, such as a memory device, if glass closure is removed, it usually omits closure of the element surface. Therefore, in the manufacturing process of the conventional camera module 1, the acceptance surface 14 of the image sensor 2 will be in the state where it exposed into the atmosphere until it joins the lens holder 5 possessing the filter 6 and the lens 7 to the mold molding body 3.

[0013]For this reason, a possibility that dust, such as dust, may adhere on the image sensor 2 (especially on the acceptance surface 14) is before the process of joining the lens holder 5 to the mold molding body 3, and it had become a cause of the debasement of an image pick. When dust adhered on the image sensor 2, the new process of removing this was needed and it had become the cause that the manufacturing yield of the camera module 1 falls.

[0014]Since infrared interception is only the purpose, the same filter 6 can be used for the infrared filter 6 currently used for the camera module 1, without originally being influenced by the kind of lens 7. However, in the conventional camera module 1, the filter 6 was built in in the lens holder 5.

[0015]For this reason, when the necessity of manufacturing the camera module 1 which made only the lens 7 the thing of another kinds (for example, lens for wide angles, etc.) without changing any portions other than lens-holder 5 arises, not only the lens 7 but the filter 6 contained in the lens holder 5 will be removed and exchanged. Thus, conventionally, with the camera module 1 of composition, when the lens holder 5 was newly designed and manufactured by change of the lens 7, the structure and the built-in method for building in the filter 6 for every kind of lens 7 had to be taken into consideration, and it had become the cause of delaying a design move.

[0016]This invention is made in view of the above-mentioned point, and is a thing.
The purpose prevents adhesion of the dust through which it passes, and can attain quality improvement of an image pick, and it is providing a camera module which can make small futility of the design move at the time of changing a lens as much as possible, and a manufacturing method for the same.

[0017] [Means for Solving the Problem]In order to solve above-mentioned SUBJECT, a means described below was provided in this invention.

[0018]A camera module concerning the invention according to claim 1, It is equipped with a semiconductor device for an image pick-up which has an acceptance surface, and this semiconductor device for an image pick-up, and. Carry out support fixing of a lens and this lens an element mounting body which has an opening which light of an object image passes, and for carrying out image formation of said object image to said semiconductor device for an image pick-up, and. A filter arranged between a lens base material allocated by said element mounting body, and said lens and an acceptance surface of said semiconductor device for an image pick-up was provided, and said filter was formed in said element mounting body.

[0019]When the necessity of exchanging only a lens for a thing of another kinds (for example, lens for wide angles, etc.), and manufacturing it arises according to the above-mentioned invention, In order for what is necessary to be to exchange only a lens base material, when newly designing and manufacturing a lens base material corresponding to a lens, it becomes unnecessary to take into consideration structure for allocating a filter at whenever [the / given], and a manufacturing method of ****, and, thereby, a design move can be brought forward.

[0020]In the camera module according to claim 1, the invention according to claim 2 formed said element mounting body with resin, and closed said semiconductor device for an image pick-up, and said filter in this element mounting body.

[0021]According to the above-mentioned invention, an acceptance surface of a semiconductor device for an image pick-up can be covered with a filter by having had composition which closed a semiconductor device for an image pick-up, and a filter in an element mounting body. For this reason, dust, such as dust, can be prevented from adhering on an element to an acceptance surface, and improvement in quality of a picture picturized can be aimed at. The invention according to claim 3, [0022]In the camera module according to claim 1 or 2, a joining member which has elasticity was allocated in a position except said acceptance surface of said semiconductor device for an image pick-up, and said filter and said semiconductor device for an image pick-up were joined to it by this joining member.

[0023]According to the above-mentioned invention, even if coefficients of thermal expansion of a filter and a semiconductor device for an image pick-up differ by having joined a filter and a semiconductor device for an image pick-up using a joining member which has elasticity, stress generated according to a difference of this coefficient of thermal expansion is absorbed by a joining member which has elasticity. For this reason, even if heat is impressed, damage to a crack etc. can be prevented from occurring in a joint position of a filter and a semiconductor device for an image pick-up, and the reliability of a camera module can be raised.

[0024]The invention according to claim 4 is characterized by area of an opening of said element mounting body being smaller than area of said filter in a camera module given in any 1 paragraph of Claims 1-3.

[0025]According to the above-mentioned invention, since a part of element mounting body serves as wrap composition in a filter, a filter can be prevented from falling out from an element mounting body, and, therefore, the reliability of a camera module can be raised.

[0026]Claims 2-4 were not in the invention according to claim 5, but a lead terminal was used for said element mounting body in a camera module given in ** 1 paragraph as an external connection terminal which connects said semiconductor device for an image pick-up outside.

[0027]It becomes possible [an element mounting body] according to the above-mentioned invention to deal with it like semiconductor packages, such as SOP (Small Outline Package) and QFP (Quad Flat Package), Manufacture of a camera module using the existing semiconductor production line can be enabled. Thereby, low-cost-izing and fertilization of a camera module can be attained.

[0028]A camera module, wherein Claims 1-5 are not in the invention according to claim 6 but said element mounting body is installing at least one electronic device other than said semiconductor device for an image pick-up in a camera module given in ** 1 paragraph.

[0029]According to the above-mentioned invention, since an electronic device other than a semiconductor device for an image pick-up is installed in an element mounting body, it comes out to attain multi-functionalization and densification of a camera module.

[0030]A semiconductor device for an image pick-up in which the invention according to claim 7 of this invention has an acceptance surface, An element mounting body equipped with this semiconductor device for an image pick-up, and a lens base material which carries out support fixing of the lens for carrying out image formation of the object image to said semiconductor device for an image pick-up, A manufacturing method of a camera module possessing a filter arranged between said lens and an acceptance surface of said semiconductor device for an image pick-up is characterized by comprising: A process of joining said filter on said semiconductor device for an image pick-up using a connecting member which has elasticity.
A process of forming an element mounting body by carrying out the resin seal of said semiconductor device for an image pick-up to which said filter was joined so that these at least some filters may be exposed from the surface. A process of allocating said lens base material in this element mounting body.

[0031]According to the above-mentioned invention, in early stages of a manufacturing process of a camera module, since a filter is joined on a semiconductor device for an image pick-up, it can prevent adhering that dust, such as dust, adheres to a semiconductor device for an image pick-up with this filter. Thereby, deterioration of quality of a picture picturized with a camera module can be prevented. Since a process of removing dust adhering to a semiconductor device for an image pick-up needed conventionally becomes unnecessary, simplification of a

manufacturing process of a camera module can be attained.

[0032]A semiconductor device for an image pick-up in which the invention according to claim 8 of this invention has an acceptance surface, An element mounting body equipped with this semiconductor device for an image pick-up, and a lens base material which carries out support fixing of the lens for carrying out image formation of the object image to said semiconductor device for an image pick-up, A manufacturing method of a camera module possessing a filter arranged between said lens and an acceptance surface of said semiconductor device for an image pick-up is characterized by comprising: A process of joining said filter on said semiconductor device for an image pick-up using a connecting member which has elasticity. A process of forming an element mounting body by carrying out the method resin seal of a wrap of said semiconductor device for an image pick-up to which said filter was joined. A process at which said filter is exposed by grinding said filter of said sealing resin, and a position which counters. A process of allocating said lens base material in this element mounting body.

[0033]In order according to the above-mentioned invention to form an element mounting body and to expose a filter by grinding a filter of this sealing resin, and a position which counters by carrying out the method resin seal of a wrap of a filter and the semiconductor device for an image pick-up, It can control that a barricade occurs in a position which a filter of an element mounting body exposed. Quality of an imaging screen picturized by barricade can be prevented from deteriorating by this, and a removal process of a barricade can be made unnecessary.

[0034]A semiconductor device for an image pick-up in which the invention according to claim 9 of this invention has an acceptance surface, An element mounting body equipped with this semiconductor device for an image pick-up, and a lens base material which carries out support fixing of the lens for carrying out image formation of the object image to said semiconductor device for an image pick-up, A manufacturing method of a camera module possessing a filter arranged between said lens and an acceptance surface of said semiconductor device for an image pick-up is characterized by comprising: A process of supplying a joining member except for a light sensing portion of said semiconductor device for an image pick-up. A process of forming an element mounting body which has an opening which said light sensing portion and said a part of joining member expose by carrying out the resin seal of said semiconductor device for an image pick-up. A process of allocating said filter in said opening. A process of allocating said lens base material in this element mounting body.

[0035]According to the above-mentioned invention, after forming an element mounting body which has an opening which a light sensing portion and a part of joining member expose, in order to allocate a filter in this opening via a joining member, a barricade does not exist in a position in which a filter of an element mounting body was allocated. Quality of an imaging screen picturized by barricade can be prevented from deteriorating by this, and a removal process of a barricade can be made unnecessary.

[0036] [Embodiment of the Invention]Next, an embodiment of the invention is described with Drawings.

[0037]Drawing 3 and drawing 4 show the camera module 20A which is the 1st working example of this invention. It is a sectional view of the camera module 20A in the state where drawing 3 (A) removed the front view of the camera module 20A, drawing 3 (B) removed the sectional view of the camera module 20A, and drawing 4 removed the lens holder 25A.

[0038]The camera module 20A is built into a portable telephone or a handy PC (portable personal computer) as an image input means, for example. If the profile of this camera module 20A is carried out, it is considered as composition with the semiconductor device 22 (henceforth the image sensor 22) for an image pick-up, the mold molding body 23A, the substrate 24A, the lens holder 25A, the infrared filter 26, the lens 27A, etc.

[0039]The image sensor 22 is a C-MOS sensor manufactured, for example by a semiconductor process, and, as for the periphery whole surface, the acceptance surface 35 into which an object image enters is formed. And when an object image enters into the acceptance surface 35, photoelectric conversion is performed and the picture signal (electrical signal) of an object image is generated.

[0040]This image sensor 22 is considered as the composition by which was located in the wearing opening 51 formed in the substrate 24A, and flip chip bonding was carried out to the mold molding body 23A. Under the present circumstances, the acceptance surface 14 of the image sensor 22 is constituted so that it may counter with the opening 34A formed in the mold molding body 23A.

[0041]The mold molding body 23A molds resin of an epoxy system, for example, and is considered as composition with the opening 34A, the resin vamp 29, and internal wiring (it does not appear in a figure). The opening 34A is constituted so that it may counter with the acceptance surface 35 of the image sensor 22. Therefore, it passes along this opening 34A, and the light of an object image enters into the image sensor 22.

[0042]The resin vamp 29 is constituted by the resin protrusion 29A formed in the mold molding body 23A, and the metal membrane 29B formed in the surface of this resin protrusion 29A. This resin vamp 29 functions as an external connection terminal like the aforementioned metallic bump 28.

[0043]The metal membrane 30 is connected to the internal wiring by which insertion molding was carried out in one at the time of molding of the mold molding body 23A. This internal wiring is pulled out by the position to which the metallic bump 28 of the above mentioned image sensor 22 is joined. Therefore, the metallic bump 28 is joined to this internal wiring by carrying out flip chip bonding of the image sensor 22. Thereby, the image sensor 22 and the metal membrane 30 serve as composition electrically connected via internal wiring.

[0044]Flip chip bonding of the mold molding body 23A considered as the above-mentioned composition is carried out to the substrate 24A by using the resin vamp 29 as an external connection terminal. The substrate 24A is a flexible substrate and is used as the sheet shaped polyimide 31 with the composition which carried out print formation of the wiring 32. As

described above, the wearing opening 51 for equipping with the image sensor 22 is formed.

[0045]As mentioned above, by having allocated the image sensor 22 in the wearing opening 51 formed in the substrate 24A, and having used flip chip bonding for connection of the image sensor 22 and the mold molding body 23A and connection of the mold molding body 23A and the substrate 24A, Slimming down and a miniaturization of the camera module 20A can be attained.

[0046]The end of the side and opposite hand in which the image sensor 22 of the above-mentioned substrate 24A is allocated is connected to the electronic circuit of the small information terminal in which the camera module 20A is incorporated. The picture signal generated with the image sensor 22 is sent to a small information terminal via the substrate 24A by this, and predetermined processing is carried out.

[0047]On the other hand, the lens 27A for the lens holder 25A to carry out image formation of the object image to the image sensor 22 is allocated. The entering light window 36 for entering an object image is formed in the lens 27A of the lens holder 25A, and the position which counters. The lens 27A is pasted up on the lens holder 25A in the entering light window 36 and the position which does not counter. Therefore, the lens 27A has the lens holder 25A and one composition.

[0048]This lens holder 25A is joined to the mold molding body 23A by the adhesives 33 for holder immobilization. Thereby, the lens holder 25A and the mold molding body 23A are unified, and the camera module 20A is formed. The lens 27A is in the state where the lens holder 25A was allocated by the mold molding body 23A, and is considered as the composition which carries out a focusing point to the acceptance surface 35 of the image sensor 22.

[0049]Here, the infrared filter 26 used as the important section of this example is observed. The infrared filter 26 does so the function which intercepts the infrared rays leading to degradation of an image pick. This infrared filter 26 is allocated between the lens 27B and the acceptance surface 35 (image sensor 22) on that character. In this example, it is not the lens holder 25A and this infrared filter 26 was allocated in the mold molding body 23A.

[0050]Even if the necessity of exchanging for another kind of thing (for example, it exchanges for the lens for wide angles from the usual convex lens), and manufacturing only the lens 27A by having this composition, for example arises, What is necessary is to exchange only the lens holder 25A, since the infrared filter 26 is formed in the mold molding body 23A.

[0051]For this reason, since it becomes unnecessary to take into consideration structure for allocating the infrared filter 26 at a given degree of that lens replacement, and a manufacturing method for the same even if it will be necessary with exchange of the lens 27A to newly design and manufacture the lens holder 25A, The design move of the camera module 20A can be brought forward. Since the cost which manufacture and a design take is reduced in connection with this, it also becomes possible to plan cost reduction of the camera module 20A.

[0052]Next, the 2nd working example of this invention is described. Drawing 5 shows the camera module 20B which is the 2nd working example of this invention. In drawing 5, about the composition and the identical configuration which were shown in drawing 3 and drawing 4, identical codes are attached and the explanation is omitted.

[0053]The camera module 20B concerning this example considered the allocation side of the image sensor 22 as the composition made similar to a BGA (Ball Grid Array) type semiconductor device. On the substrates 24B, such as a glass epoxy board, the image sensor 22 uses the die bond adhesive 41, and, specifically, is being fixed. The electrical link of this image sensor 22 and substrate 24B is performed using the wire 38. The image sensor 22 is considered as the composition by which the resin seal was carried out with the mold resin 40A (it corresponds to an element mounting body given in a claim). Resin of an epoxy system can be used as a material of the mold resin 40A.

[0054]On the other hand, the infrared filter 26 is allocated in the field in which the acceptance surface 35 of the image sensor 22 was formed via the adhesives 37 (joining member). In this example, as these adhesives 37, also after fixing the infrared filter 26 to the acceptance surface 35 (namely, after solidifying), the material which has predetermined elasticity is selected.

[0055]By this example, the infrared filter 26 is also considered as the composition by which the resin seal was carried out to the mold resin 40A like the image sensor 22. For this reason, after fixing the infrared filter 26 to the image sensor 22 using the adhesives 37, at the time of formation of the mold resin 40A, it has composition to which mold processing is carried out, so that it may mention later.

[0056]By the way, when joining the infrared filter 26 to the image sensor 22 with the adhesives 37, the adhesives 37 are allocated so that the acceptance surface 35 of the image sensor 22 may be surrounded. Under the present circumstances, the adhesives 37 are allocated except for the light sensing portion of the acceptance surface 35. Thereby, the infrared filter 26 serves as composition fixed to the acceptance surface 35 in the periphery.

[0057]Thus, the adhesives 37 function as a dam at the time of the mold of the mold resin 40A by forming the adhesives 37 annularly between the infrared filter 26 and the acceptance surface 35. Thereby, resin can be prevented from invading in the opening 34B at the time of a mold. Therefore, the shadow of invasion resin cannot be reflected to the image pick of the image sensor 22, and a quality imaging screen can be realized.

[0058]The periphery of the infrared filter 26 is closed with the mold resin 40A. For this reason, since the opening 34B (it becomes a field through which the light of an object image passes) formed in the mold resin 40A is blockaded with the infrared filter 26 and the mold resin 40A, dust does not invade in the opening 34B. Therefore, even if it carries out long term use of the camera module 20B, dust does not adhere to the acceptance surface 35 and a quality imaging screen can be maintained for a long time.

[0059]Even if the coefficients of thermal expansion of the image sensor 22 and the infrared filter 26 differ by having joined the image sensor 22 and the infrared filter 26 using the adhesives 37

which have elasticity, the stress generated according to a difference of this coefficient of thermal expansion is absorbed with the adhesives 37 which have elasticity. For this reason, even if heat is impressed, the damage to a crack etc. can be prevented from occurring in the joint position of the image sensor 22 and the infrared filter 26, and the reliability of the camera module 20B can be raised.

[0060]In lens fitting structure, the lens 27A was considered as the composition pasted up on the lens holder 25A in the 1st working example. However, in the camera module 20B concerning this example, the section extending 52 which extends towards the outside on the periphery of the lens 27B is formed, and this section extending 52 is considered as the composition fixed to the lens holder 25B by carrying out insertion formation in one at the time of formation of the lens holder 25B. The lens holder 25B can be made to support the lens 27B with high reliability, without being influenced by degradation of adhesives etc. by having this composition.

[0061]Next, the 3rd working example of this invention is described. Drawing 6 shows the camera module 20C which is the 3rd working example of this invention. In drawing 6, about the composition and the identical configuration which were shown in drawing 5, identical codes are attached and the explanation is omitted. Suppose that it is the same also in each figure after drawing 7 used for the explanation after the 4th working example mentioned later.

[0062]In the camera module 20B of the 2nd above mentioned working example. The image sensor 22 was allocated in the substrate 24B which consists of glass epoxy boards etc., and the allocation side of the image sensor 22 was considered as the composition made similar to a BGA (Ball GridArray) type semiconductor device by closing the image sensor 22 with the mold resin 40A.

[0063]On the other hand, in this example, the lead terminal 42 was used as an external connection terminal which connects the image sensor 22 with the exterior. By having this composition, the mold resin 40B becomes possible [dealing with it like semiconductor packages, such as SOP (Small Outline Package) and QFP (Quad Flat Package),]. It can be made to correspond also to a surface mount by molding the lead terminal 42 in the shape of a gull wing.

[0064]This lead terminal 42 can be easily formed by using a leadframe using the existing semiconductor production line. therefore, the thing for which the camera module 20C concerning this example uses the existing semiconductor production line -- low-cost-izing -- and it can manufacture efficiently.

[0065]Next, the 4th working example of this invention is described. Drawing 7 shows the camera module 20D which is the 4th working example of this invention. in the camera module 20B which the camera module 20D concerning this example requires for the 2nd working example shown in drawing 5 -- the back side (the allocation side of the mold resin 40B, the other half side) of the substrate 24B -- it had composition which allocated the electronic device This example shows the example which formed the element 43 for a drive which carries out drive controlling of the image sensor 22 as an electronic device.

[0066]This element 43 for a drive has the vamp 44, and is considered as the composition joined to the substrate 24B by flip chip bonding. In order to prevent the defecting joining of the vamp 44 resulting from the thermal expansion difference of the element 43 for a drive, and the substrate 24B, the underfile resin 45 is infixed between the element 43 for a drive, and the substrate 24B.

[0067]In addition to the image sensor 22 which performs image pick-up processing, like this example, multi-functionalization and densification of the camera module 20D can be attained by forming the element 43 for a drive. Thereby, the further miniaturization of the electronic equipment (small information terminal etc.) by which the camera module 20D is formed can be attained.

[0068]Next, the 5th working example of this invention is described. Drawing 8 shows the camera module 20E which is the 5th working example of this invention. The camera module 20E concerning this example is considered as the composition which formed the element 43 for a drive which carries out drive controlling of the image sensor 22 to the back side of the substrate 24B like the camera module 20D concerning the 4th working example shown in drawing 6.

[0069]However, in the camera module 20D concerning the 4th working example. By this example, the element 43 for a drive is joined to the substrate 24B with the die bond adhesive 41 to having carried out flip chip bonding of the element 43 for a drive to the substrate 24B, and it has composition which carried out wire connection of the element 43 for a drive, and the substrate 24B using the wire 46. The element 43 for a drive is considered as the composition which carried out the resin seal with the mold resin 47.

[0070]The miniaturization of the small information terminal etc. which can attain multi-functionalization and densification of the camera module 20E and in which the camera module 20E is formed by this example like the camera module 20E which is the 5th working example can be attained. In this example, since the resin seal of the element 43 for a drive is carried out with the mold resin 47, the external force impression to the element 43 for a drive can be prevented, and the reliability of the camera module 20E can be improved.

[0071]Next, the 6th working example of this invention is described. Drawing 9 shows the camera module 20F which is the 6th working example of this invention. The camera module 20F concerning this example is characterized by setting up smaller than the area S1 of the infrared filter 26 the area S2 of the opening 34B currently formed in the mold resin 40C (S2<S1). The area S1 here and the area S2 are area when plane view of the camera module 20F is carried out.

[0072]As the infrared filter 26 was described above, a mold is carried out into the mold resin 40C, but the opening 34B for the light of an object image to make it passing is formed in the lens 27B of the mold resin 40C, and the portion which counters. Like each above mentioned working example, when the area S2 of the opening 34B and the area S1 of the infrared filter 26 were equal (S1=S2), the mold resin 40B did not exist on the light incidence face of the infrared filter 26.

[0073]However, when degradation occurs in the adhesives 37 by having used it, for example under the severe service condition over a long period of time etc., there is a possibility that the infrared filter 26 may secede from the mold resin 40B.

[0074]On the other hand, in the camera module 20F concerning this example, since the area S2 of the opening 34B is set up smaller than the area S1 of the infrared filter 26 (S2<S1), some mold resin 40C always serves as wrap composition in the infrared filter 26. That is, it will engage with the light incidence face of the infrared filter 26, and the suspending portion 48 which stops this will be formed in the mold resin 40C.

[0075]Therefore, since the infrared filter 26 is stopped by the suspending portion 48 formed in the mold resin 40C, dropping out of the mold resin 40C is prevented. Infrared rays can be prevented from entering into the image sensor 22 by secession of the infrared filter 26 by this, and the reliability of the camera module 20F can be raised.

[0076]Although the suspending portion 48 had composition engaged over the perimeter of the infrared filter 26 in this example, it is not necessary to necessarily perform engagement to the suspending portion 48 and the infrared filter 26 in the perimeter. If secession from the mold resin 40C of the infrared filter 26 can be prevented, it is good also as composition which prevents secession of the infrared filter 26 by two or more suspending portions 48.

[0077]Then, the manufacturing method of a camera module is explained with reference to drawing 10 thru/or drawing 13. The manufacturing method of the camera module 20B which is the 2nd above mentioned working example shall be mentioned as an example, and the following explanation shall explain it. In drawing 10 thru/or drawing 13, about the composition and the identical configuration which were shown in drawing 3 thru/or drawing 9 used for previous explanation, identical codes are attached and the explanation is omitted.

[0078]Drawing 10 shows the manufacturing method of the camera module 20B which is the 1st working example of this invention. In order to manufacture the camera module 20B in this example, as first shown in drawing 10 (A), die bonding of the image sensor 22 is carried out to the substrate 24B using the die bond adhesive 41, and the substrate 24B is connected with the image sensor 22 using the wire 38.

[0079]Then, the adhesives 37 are allocated in the acceptance surface 35 of the image sensor 22 so that the periphery may be surrounded. these adhesives 37 -- said -- it carried out -- as -- predetermined elasticity -- an owner -- the bottom is a thing. And the infrared filter 26 is allocated in the upper part of the image sensor 22 using these adhesives 37.

[0080]As mentioned above, if the image sensor 22 and infrared filter 26 grade are allocated on the substrate 24B, the molding metal mold for carrying out mold molding of the mold resin 40A will be equipped with this substrate 24B. And the mold resin 40B is formed by performing mold processing.

[0081]Under the present circumstances, the acceptance surface which are some infrared filters 26 is constituted so that it may expose from the surface (the lens 27B and field which counters) of

the mold resin 40A. Thus, processing to which the acceptance surface of the infrared filter 26 is exposed can be easily performed by making the infrared filter 26 contact a metallic mold inner surface etc. Drawing 10 (B) shows the state where the mold resin 40A was formed.

[0082]As mentioned above, formation of the mold resin 40A will allocate the lens holder 25B in the upper part of the mold resin 40A, as continuously shown in drawing 10 (C). The lens holder 25B is manufactured in a separated process, and the lens 27B is beforehand built into the inside.

[0083]The junction to the lens holder 25B and the mold resin 40A is good also as composition joined using the splicing-machine style which is not illustrated in consideration of a maintenance, even if it fixes using adhesives. Thus, the camera module 20B is manufactured by allocating the lens holder 25B in the upper part of the mold resin 40A.

[0084]According to the manufacturing method of the camera module 20B concerning this example, in the early stages of the manufacturing process of the camera module 20E, the infrared filter 26 is joined on the image sensor 22. The adhesives 37 which join the image sensor 22 and the infrared filter 26 are allocated so that the periphery of the acceptance surface 35 may be surrounded.

[0085]Therefore, since the acceptance surface 35 of the image sensor 22 will be in the state where it was blockaded by the infrared filter 26 and the adhesives 37, it can prevent adhering that dust, such as dust, adheres to the acceptance surface 35. Thereby, deterioration of the quality of the picture picturized with the camera module 20B can be prevented. Since the process of removing the dust adhering to the image sensor 22 (acceptance surface 35) needed conventionally becomes unnecessary, the manufacturing process of the camera module 20E can be simplified.

[0086]Next, the manufacturing method of the camera module 20B which is the 2nd working example is explained. Drawing 11 shows the manufacturing method of the camera module 20B which is the 2nd working example of this invention. Also in this example, as first shown in drawing 11 (A), die bonding of the image sensor 22 is carried out to the substrate 24B using the die bond adhesive 41, the substrate 24B is connected with the image sensor 22 using the wire 38, adhesives 37 is taken for the acceptance surface 35 of the image sensor 22, and the infrared filter 26 is allocated in it.

[0087]As mentioned above, if the image sensor 22 and infrared filter 26 grade are allocated on the substrate 24B, mold processing which forms the mold resin 40D continuously will be carried out. Under the present circumstances, in this example, as shown in drawing 11 (B), method mold processing of a wrap is performed for the mold resin 40D in the acceptance surface of the infrared filter 26 (this coating part is called covering section 49). Under the present circumstances, in the acceptance surface of the infrared filter 26 of the mold resin 40D, the thickness of the wrap covering section 49 is set up so that it may be set to tens of micrometers - about 1 mm.

[0088]An end of formation processing of the mold resin 40D will carry out processing which grinds the covering section 49 of the mold resin 40D continuously. Thereby, as the wrap

covering section 49 is removed and the infrared filter 26 of the mold resin 40D is shown in drawing 11 (C), the infrared filter 26 will be in the state where it exposed from the mold resin 40D. Drawing 11 (C) shows the state where the lens holder 25B was allocated on the mold resin 40D.

[0089]As mentioned above, if the infrared filter 26 is exposed from the mold resin 40D, as continuously shown in drawing 11 (C), the lens holder 25B inside which the lens 27B was installed will be allocated in the upper part of the mold resin 40D. And thereby, the camera module 20B is manufactured.

[0090]In order to expose the infrared filter 26 by grinding the mold resin 40D by which method formation of a wrap was carried out in the infrared filter 26 according to the manufacturing method concerning above-mentioned this example, A barricade (resin burr) can be prevented from occurring in the position which the infrared filter 26 of the mold resin 40D exposed.

[0091]Therefore, the quality of the imaging screen which a barricade serves as a shadow and is picturized by the image sensor 22 can be prevented from deteriorating. The removal process of a troublesome barricade can be made unnecessary and simplification of a manufacturing process can be attained.

[0092]Next, the manufacturing method of the camera module 20B which is the 3rd working example is explained. Drawing 12 shows the manufacturing method of the camera module 20B which is the 3rd working example of this invention. In this example, die bonding of the image sensor 22 is carried out to the substrate 24B using the die bond adhesive 41, and the substrate 24B is connected with the image sensor 22 using the wire 38. Next, the adhesives 37 are allocated in the acceptance surface 35 of the image sensor 22. Under the present circumstances, the adhesives 37 are allocated except for the light sensing portion of the acceptance surface 35.

[0093]In the manufacturing method of the camera module 20B concerning the 1st and 2nd above mentioned working example, an end of loading processing of the above-mentioned image sensor 22 carried out processing which allocates the infrared filter 26 on the image sensor 22 continuously. On the other hand, in this example, an end of the loading processing to the substrate 24B of the image sensor 22 is characterized by carrying out mold processing which forms the mold resin 40E.

[0094]Drawing 12 (A) shows the state where the mold resin 40E which closes the image sensor 22 was formed on the substrate 24B. As shown in the figure, the opening 34B is formed in the position which the mold resin 40E counters with the acceptance surface 35 of the image sensor 22. And the acceptance surface 35 of the image sensor 22 and some adhesives 37 have composition exposed from this opening 34B.

[0095]After the above-mentioned mold processing is completed, the infrared filter 26 is allocated by the opening 34B currently continuously formed in the mold resin 40E. Allocation processing of this infrared filter 26 inserts the infrared filter 26 from the upper part of the opening 34B, and is performed by carrying out adhesion fixing with the adhesives 37.

[0096]As mentioned above, if the mold resin 40E is equipped with the infrared filter 26, as continuously shown in drawing 12 (B), the lens holder 25B inside which the lens 27B was installed will be allocated in the upper part of the mold resin 40E, and, thereby, the camera module 20B will be manufactured.

[0097]After forming the mold resin 40E which has the opening 34B which the acceptance surface 35 and some adhesives 37 expose according to the manufacturing method concerning above-mentioned this example, It writes with the manufacturing method which allocates infrared filter 26 filter in this opening 34B via the adhesives 37, and a barricade (resin burr) does not occur on the boundary part of the infrared filter 26 and the mold resin 40E, and the infrared filter 26.

[0098]Therefore, the quality of the imaging screen which a barricade serves as a shadow and is picturized by the image sensor 22 can be prevented from deteriorating. The removal process of a troublesome barricade can be made unnecessary and simplification of a manufacturing process can be attained. As are shown in drawing 13 (A) and it is shown in the camera module 20G in the state where the infrared filter 26 became depressed from the upper surface 50 of the mold resin 40A, and drawing 13 (B), The camera module 20H in the state where the infrared filter 26 projected from the upper surface 50 of the mold resin 40A can also be manufactured easily.

[0099] [Effect of the Invention]Like ****, according to this invention, it can state below and various effects can be realized.

[0100]According to the invention according to claim 1, when newly designing and manufacturing a lens base material corresponding to a lens, it becomes unnecessary to take into consideration the structure for allocating a filter at whenever [the / given], and the manufacturing method of ****, and, thereby, a design move can be brought forward.

[0101]According to the invention according to claim 2, since the acceptance surface of the semiconductor device for an image pick-up can be covered with a filter, dust, such as dust, can be prevented from adhering on an element to an acceptance surface, and improvement in the quality of the picture picturized can be aimed at. Since according to the invention according to claim 3 the stress generated according to a difference of this coefficient of thermal expansion is absorbed by the joining member which has elasticity even if the coefficients of thermal expansion of a filter and the semiconductor device for an image pick-up differ, Even if heat is impressed, the damage to a crack etc. can be prevented from occurring in the joint position of a filter and the semiconductor device for an image pick-up, and the reliability of a camera module can be raised.

[0102]According to the invention according to claim 4, since a part of element mounting body serves as wrap composition in a filter, a filter can be prevented from falling out from an element mounting body, and, therefore, the reliability of a camera module can be raised.

[0103]According to the invention according to claim 5, since it becomes possible to deal with an element mounting body like a semiconductor package, manufacture of the camera module using the existing semiconductor production line is enabled, and therefore, low-cost-izing and

fertilization of a camera module can be attained.

[0104]According to the invention according to claim 6, since an electronic device other than the semiconductor device for an image pick-up is installed in an element mounting body, multi-functionalization and densification of a camera module can be attained.

[0105]According to the invention according to claim 7, it can prevent adhering that dust, such as dust, adheres to the semiconductor device for an image pick-up with a filter, and deterioration of the quality of the picture picturized with a camera module can be prevented. Since the process of removing the dust adhering to the semiconductor device for an image pick-up needed conventionally becomes unnecessary, simplification of the manufacturing process of a camera module can be attained.

[0106]According to Claim 8 and the invention according to claim 9, since it can control that a barricade occurs in the filter arranging position of an element mounting body, the quality of the imaging screen picturized by the barricade can be prevented from deteriorating, and the removal process of a barricade can be made unnecessary.

[Claim(s)]

[Claim 1]A camera module which is provided with the following and characterized by forming said filter in said element mounting body.
A semiconductor device for an image pick-up which has an acceptance surface.
An element mounting body which it is equipped with this semiconductor device for an image pick-up, and has an opening which light of an object image passes.
A lens for carrying out image formation of said object image to said semiconductor device for an image pick-up.
A filter which support fixing of this lens is carried out, and is arranged between a lens base material allocated by said element mounting body, and said lens and an acceptance surface of said semiconductor device for an image pick-up.

[Claim 2]A camera module having formed said element mounting body with resin, and closing said semiconductor device for an image pick-up, and said filter in this element mounting body in the camera module according to claim 1.

[Claim 3]A camera module which allocates a joining member which has elasticity in a position except said acceptance surface of said semiconductor device for an image pick-up in the camera module according to claim 1 or 2, and is characterized by joining said filter and said semiconductor device for an image pick-up by this joining member.

[Claim 4]A camera module characterized by area of an opening of said element mounting body being smaller than area of said filter in a camera module given in any 1 paragraph of Claims 1-3.

[Claim 5]A camera module, wherein Claims 2-4 were not but a lead terminal is used for said element mounting body in a camera module given in ** 1 paragraph as an external connection

terminal which connects said semiconductor device for an image pick-up outside.

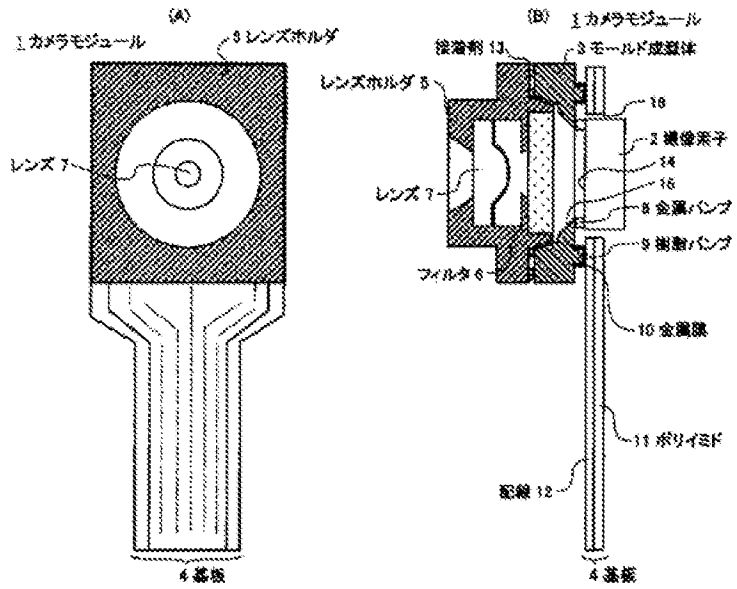
[Claim 6]A camera module, wherein Claims 1-5 are not but said element mounting body is installing at least one electronic device other than said semiconductor device for an image pick-up in a camera module given in ** 1 paragraph.

[Claim 7]A semiconductor device for an image pick-up which has an acceptance surface, and an element mounting body equipped with this semiconductor device for an image pick-up, A lens base material which carries out support fixing of the lens for carrying out image formation of the object image to said semiconductor device for an image pick-up, A process of joining said filter using a connecting member which is a manufacturing method of a camera module possessing a filter arranged between said lens and an acceptance surface of said semiconductor device for an image pick-up, and has elasticity on said semiconductor device for an image pick-up, A manufacturing method of a camera module having a process of forming an element mounting body by carrying out the resin seal of said semiconductor device for an image pick-up to which said filter was joined so that these at least some filters may be exposed from the surface, and the process of allocating said lens base material in this element mounting body.

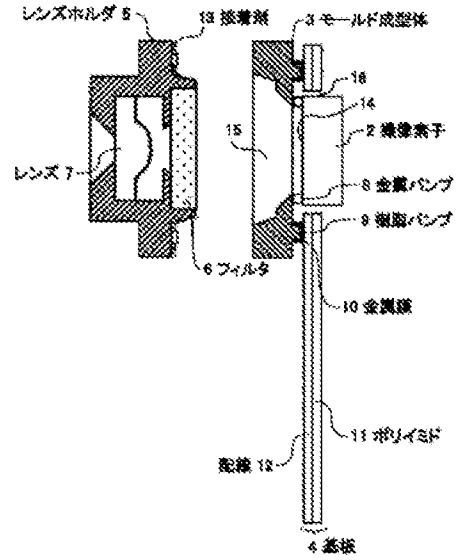
[Claim 8]A semiconductor device for an image pick-up which has an acceptance surface, and an element mounting body equipped with this semiconductor device for an image pick-up, A lens base material which carries out support fixing of the lens for carrying out image formation of the object image to said semiconductor device for an image pick-up, A process of joining said filter using a connecting member which is a manufacturing method of a camera module possessing a filter arranged between said lens and an acceptance surface of said semiconductor device for an image pick-up, and has elasticity on said semiconductor device for an image pick-up, By grinding a process of forming an element mounting body by carrying out the method resin seal of a wrap of said semiconductor device for an image pick-up to which said filter was joined, and said filter of said sealing resin and a position which counters, A manufacturing method of a camera module having a process at which said filter is exposed, and the process of allocating said lens base material in this element mounting body.

[Claim 9]A semiconductor device for an image pick-up which has an acceptance surface, and an element mounting body equipped with this semiconductor device for an image pick-up, A lens base material which carries out support fixing of the lens for carrying out image formation of the object image to said semiconductor device for an image pick-up, A process of being a manufacturing method of a camera module possessing a filter arranged between said lens and an acceptance surface of said semiconductor device for an image pick-up, and supplying a joining member except for a light sensing portion of said semiconductor device for an image pick-up, A process of forming an element mounting body which has an opening which said light sensing portion and said a part of joining member expose by carrying out the resin seal of said semiconductor device for an image pick-up, A manufacturing method of a camera module having a process of allocating said filter in said opening, and the process of allocating said lens base material in this element mounting body.

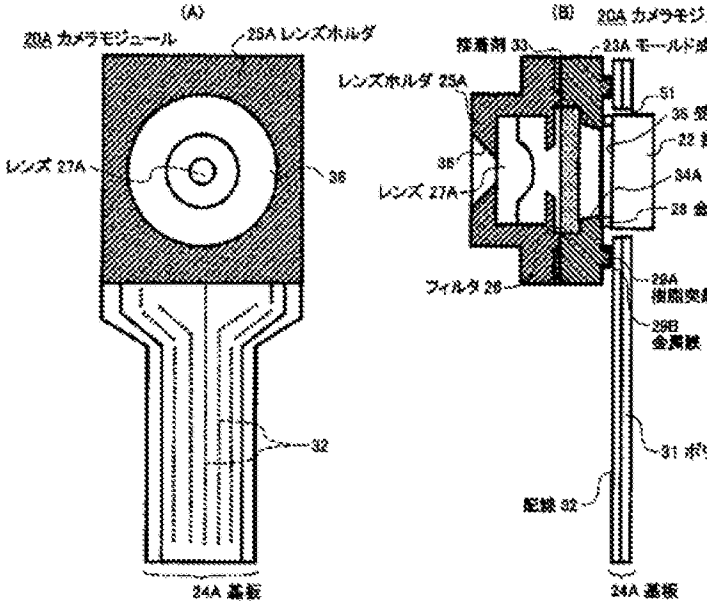
[Drawing 1]



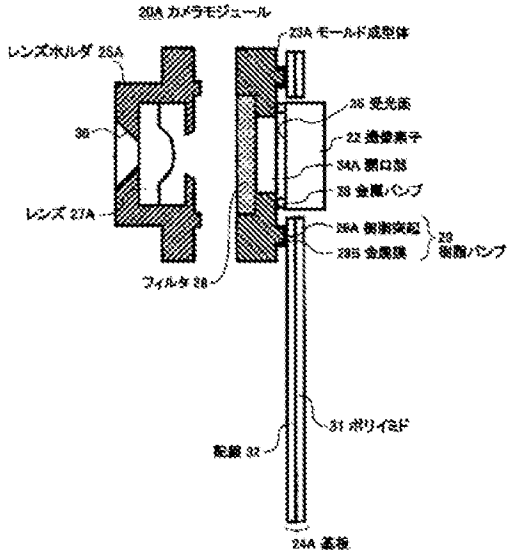
[Drawing 2]



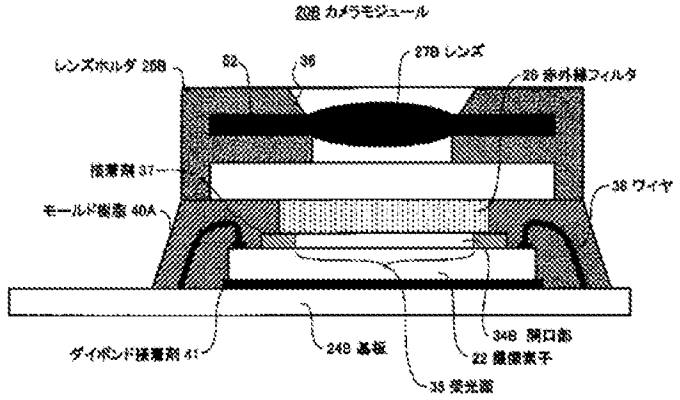
[Drawing 3]



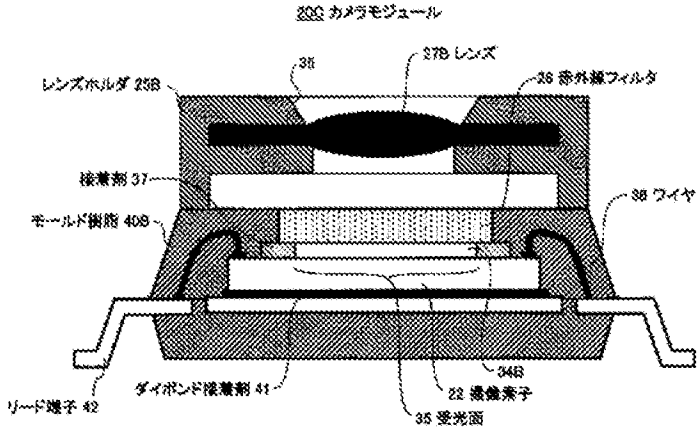
[Drawing 4]



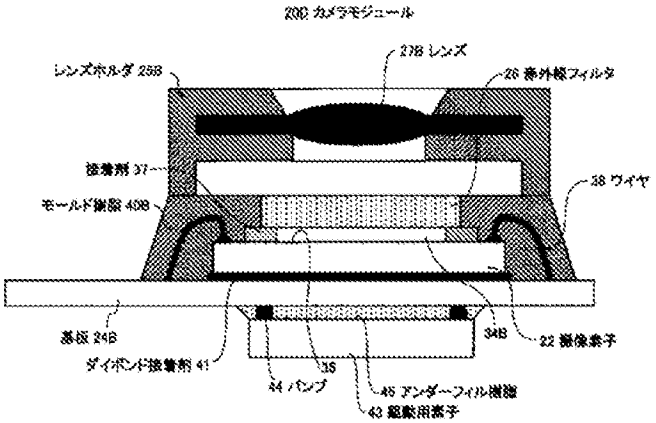
[Drawing 5]



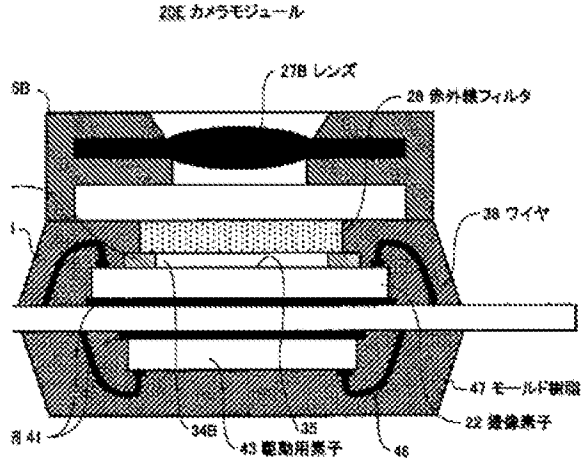
[Drawing 6]



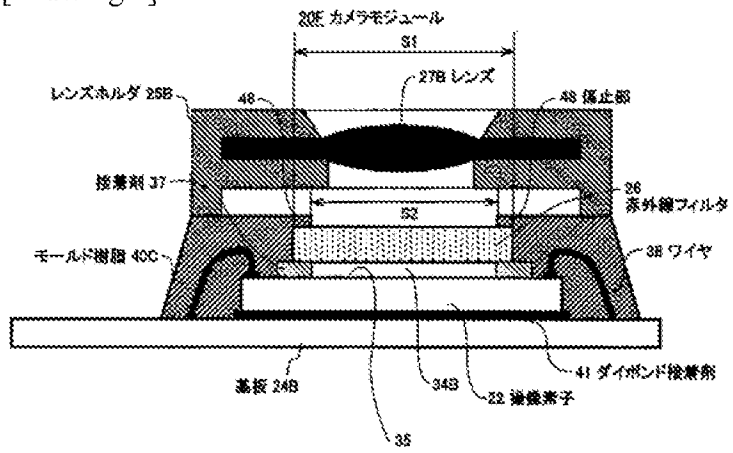
[Drawing 7]



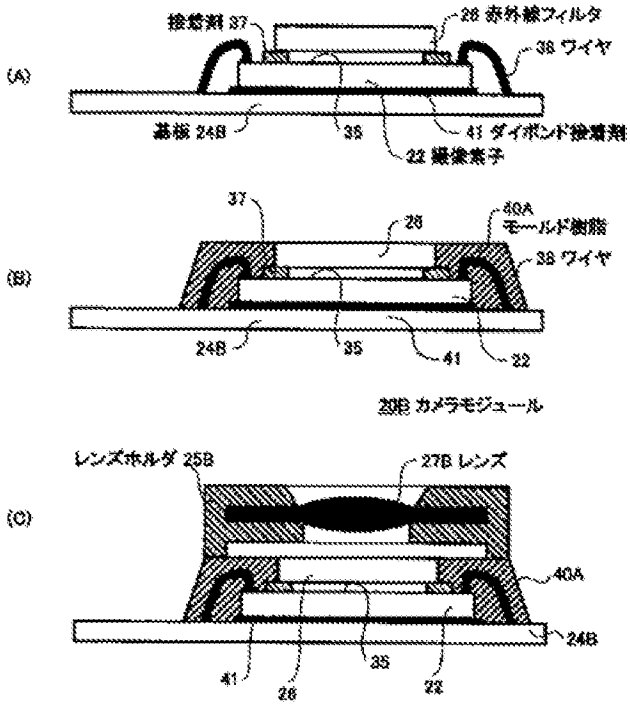
[Drawing 8]



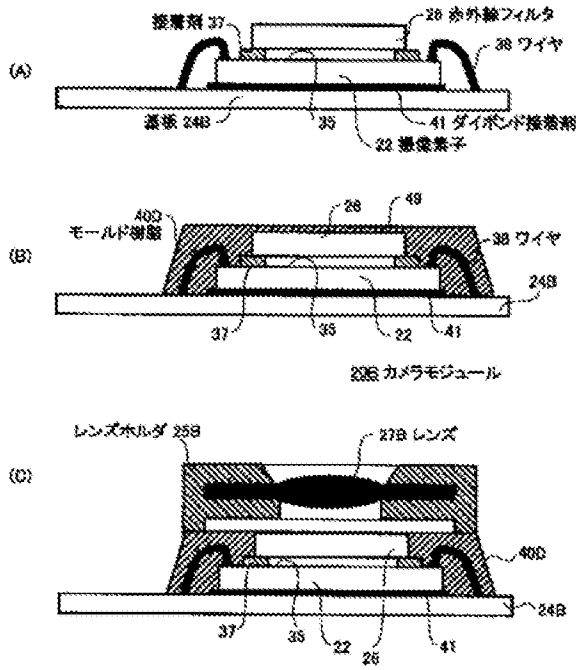
[Drawing 9]



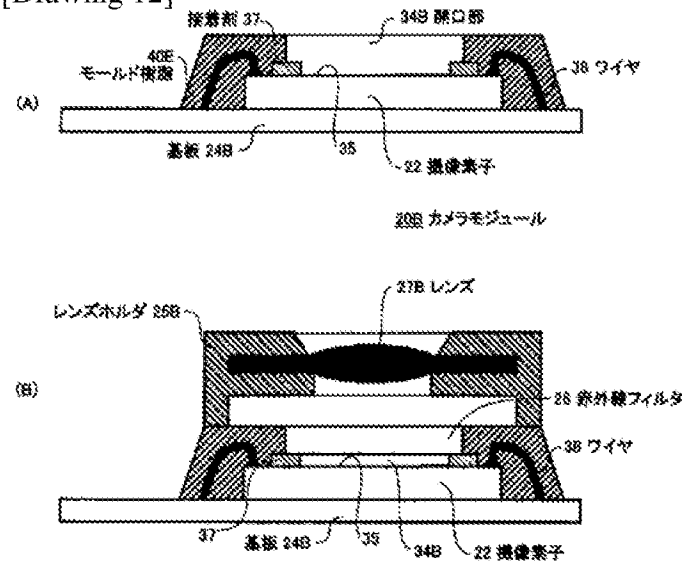
[Drawing 10]



[Drawing 11]



[Drawing 12]



[Drawing 13]